

We claim:

1. An umbrella device comprising:

a canopy;
a canopy mechanism adapted to expand and collapse said canopy;
5 a base; and

an arm assembly disposed between said base and said canopy mechanism, said arm assembly having a proximal end pivotally connected to said base and a distal end pivotally connected to said canopy mechanism, said arm assembly being operable, by pivoting said proximal end relative to said base, between a retracted configuration and a protracted configuration, said arm assembly protracting when said proximal end pivots in a first pivotal direction and retracting when said proximal end pivots in a second opposite pivotal direction, said arm assembly including a plurality of operatively associated elongated members, said plurality of elongated members including at least one pair of said members pivotally connected at an intermediate portion of each member, and said paired members pivoting in opposite directions to one another during operation.

2. The umbrella device of claim 1, wherein said canopy mechanism is disposed in a first direction relative to said base in said retracted configuration and in a second direction relative to said base, substantially transverse to said first direction, in said protracted configuration.

3. The umbrella device of claim 1, wherein said distal end of said arm assembly follows an approximately arcuate path between said retracted and protracted configurations.

4. The umbrella device of claim 1, wherein said distal end of said arm assembly is operatively connected to said canopy mechanism such that said operation of said umbrella device simultaneously expands said canopy in said extended open configuration and collapses said canopy in said retracted closed configuration.

5. The umbrella device in claim 1, wherein said canopy mechanism comprises a shaft, a slide adapted for axial movement on said shaft and a plurality of foldable ribs operatively associated with said canopy and said slide, wherein said canopy mechanism is adapted to expand and collapse said canopy by axial movement of said slide.

6. The umbrella device of claim 1, wherein said plurality of members comprise:

a first member pivotally connected at a proximal end to said base;

a second member pivotally connected at a proximal end to said base;

a third member pivotally connected at a proximal end to a distal end of said
5 second member and having an intermediate portion pivotally connected to an
intermediate portion of said first member;

a fourth member pivotally connected at a proximal end to a distal end of said
second member and pivotally connected at a distal end to said slide;

a fifth member pivotally connected at a proximal end to said distal end of said
10 first member and pivotally connected at a distal end to an intermediate portion of
said fourth member; and

a sixth member pivotally connected at a proximal end to said distal end of said
first member and pivotally connected at a distal end to said shaft proximal end.

7. The umbrella device of claim 1, wherein said plurality of members comprise:

15 a first member pivotally connected at a proximal end to said base;

a second member pivotally connected at a proximal end to said base;

a third member pivotally connected at a proximal end to a distal end of said
second member and having an intermediate portion pivotally connected to an
intermediate portion of said first member;

20 a fourth member pivotally connected at a proximal end to said distal end of
said third member;

a fifth member pivotally connected at a proximal end to said distal end of
said first member and having an intermediate portion pivotally connected to an
intermediate portion of said fourth member;

25 a sixth member pivotally connected at a proximal end to said distal end of
said fifth member and pivotally connected at a distal end to said slide;

a seventh member pivotally connected at a proximal end to said distal end of
said fourth member and pivotally connected at a distal end to an intermediate
portion of said sixth member;

30 an eighth member pivotally connected at a proximal end to said distal end of
said fourth member and pivotally connected at a distal end to said shaft proximal
end.

8. The umbrella device of claim 7, wherein said canopy mechanism comprises:

a shaft having a proximal end connected to an intermediate point of said arm assembly between said arm assembly proximal and distal ends and a distal end connected to said canopy; and

5 a slide adapted for axial movement on said shaft, said slide being operatively associated with said canopy to expand said canopy when driven towards said shaft distal end and collapse said canopy when driven towards said shaft proximal end;

wherein said slide is connected to said arm assembly distal end such that said operation to said extended open configuration displaces said arm assembly distal end from said intermediate point, driving said slide toward said shaft distal end and said operation to said retracted closed configuration retracts said arm assembly distal end towards said intermediate point, driving said slide toward said shaft proximal end.

9. The umbrella device of claim 8, wherein said slide is operatively associated with said canopy by means of a plurality of radial ribs, each said rib comprising a plurality of operatively associated longitudinal links, wherein said links of each said rib are adapted to align longitudinally in said open configuration to expand said canopy and to fold adjacently in said closed configuration to collapse said canopy and wherein said links are adapted to fold said canopy such that in said closed configuration, an outermost link of each said rib folds the peripheral edge of said canopy adjacent said shaft distal end.

10. The umbrella device of claim 9, wherein said outermost link is the longest link of each said rib.

11. The umbrella device of claim 1 wherein said arm assembly is adapted to form a bifurcated Y-shape in the extended open configuration.

12. The umbrella device of claim 11 wherein each branch of said bifurcated arm assembly is operatively connected to said canopy mechanism such that said operation of said umbrella device simultaneously expands said canopy in said extended open configuration and collapses said canopy in said retracted closed configuration.

13. The umbrella device of claim 12, wherein said canopy mechanism comprises a pair of shafts, each shaft having a slide adapted for axial movement on said shaft

and a plurality of foldable ribs operatively associated with said canopy and said slides, wherein said canopy mechanism is adapted to expand and collapse said canopy by axial movement of said slides.

14. The umbrella device of claim 13, wherein said arm assembly comprises:

5 a first member pivotally connected at a proximal end to said base;

a pair of second members pivotally connected at a proximal end to said base and adapted to pivot in parallel to one another;

a pair of third members pivotally connected at a proximal end to a distal end of said pair of second members and having an intermediate portion pivotally
10 connected to an intermediate portion of said first member;

a pair of fourth members, each pivotally connected at a proximal end, by a joint having two degrees of freedom, to a distal end of one of said third members;

a pair of fifth members pivotally connected at a proximal end, by a joint having two degrees of freedom, to a distal end of said first member, each of said fifth
15 members having an intermediate portion pivotally connected to an intermediate portion of one of said fourth members;

a pair of sixth members, each pivotally connected at a proximal end to a distal end of one of said fifth members and pivotally connected at a distal end to one of said slides;

20 a pair of seventh members, each pivotally connected at a proximal end to a distal end of one of said fourth members and pivotally connected at a distal end to an intermediate portion of one of said sixth members;

a pair of eighth members, each pivotally connected at a proximal end to said distal end of one of said fourth members and pivotally connected at a distal end to
25 said proximal end of one of said shafts.

15. The umbrella device of claim 14 wherein said canopy device further comprises a central rib extending between said distal ends of said shafts, said central rib being adapted to fold such that said distal ends fold towards one another when said canopy is collapsed.

30 16. The umbrella device of claim 1 further comprising a locking mechanism for locking said arm assembly in at least one of said retracted and protracted configurations.

17. The umbrella device of claim 8, wherein said locking mechanism comprises a spring biased catch provided on said base, said catch being adapted to be engaged and depressed, by a locking pin provided on said arm assembly, during said operation of said arm assembly in said first pivotal direction and to retain said locking pin adjacent said base in said protracted configuration.
18. The umbrella device of claim 1, wherein said base is adapted to be secured to the body of a user.
19. The umbrella device of claim 1, further comprising a casing adapted to enclose said arm assembly, canopy mechanism and canopy, when said umbrella device is in said retracted closed configuration.
20. The umbrella device of claim 19, wherein said casing comprises at least one flap secured to said base and adapted to wrap around and enclose said arm assembly, canopy mechanism and canopy.
21. The umbrella device of claim 20, wherein said casing comprises at least two flaps secured to opposite sides of said base, said flaps adapted to be fastened together to enclose said arm assembly, canopy mechanism and canopy.
22. The umbrella device of claim 21, wherein said flaps are fastened by means of hook and loop type fasteners.
23. The umbrella device of claim 18, further comprising an elongated slidable extension attached to said base and having a lower end adapted to be secured to said user wherein said base is adapted to slide vertically along said extension raising or lowering said base with respect to said secured lower end of said extension.
24. The umbrella device of claim 18 wherein said base is securable to a user's belt by means of a belt clip.
25. The umbrella device of claim 18 wherein said base is securable to said user by means of a waist strap.
26. The umbrella device of claim 18 wherein said base is securable to said user by means of one or more straps.